58718

Printed Pages – 6 EEC – 101/201

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3302 Roll No. | | | | | | | | | | |

B.Tech.

(SEM II) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

ELECTRONICS ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note : *Attempt ALL questions.*

SECTION - A

Attempt **all** parts of this question. All parts of the question **carry equal** marks.

1. This question contains 10 objective type/fill in the blank type/true-false type questions. Select most appropriate option. **(10x2=20)**

(a) When we apply reverse bias to a junction diode, it :

(i) lowers the potential barrier.

(ii) raises the potential barrier.

(iii) greatly decreases the minority-carrier current.

(iv) greatly increases the majority-carrier current.

(b) Ripple frequency of the output wave form of a full-wave rectifier when fed with a 50 Hz sine wave is :

(i) 25 Hz

(ii) 50 Hz

(iii) 100 Hz

(iv) 200 Hz

(c) "An ordinary transistor is called 'Bipolar Junction Transistor' because it has two poles-one positive and the other negative". The statement is :

(i) True

(ii) False

(d) The transistor configuration which provides highest output impedance is :

(i) Common Base

(ii) Common Emitter

(iii) Common Collector

(iv) None of the above

(e) In a Field Effect Transistor (FET) the gate to source voltage that gives zero drain current is called _____ voltage.

(f) When the positive voltage on the gate of a p-channel JFET is increased, its drain current :

(i) increases

(ii) decreases

(iii) remains the same

(iv) none of the above

(g) For the circuit shown in Figure - 1., the output voltage v_0 is given by :

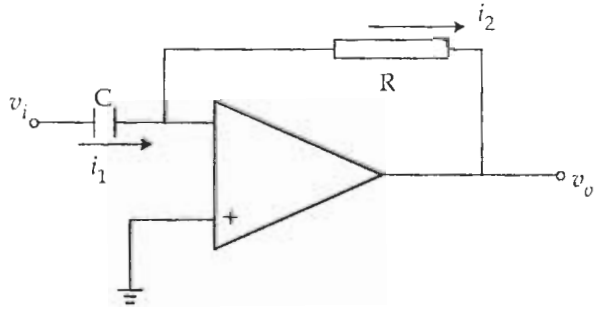

Figure - 1

(i) $v_0 = -\frac{1}{RC}\frac{dv_i\ (t)}{dt}$

(ii) $v_0 = -\frac{1}{RC}\int_0^t v_i\ (t)\,dt$

(iii) $v_0 = -RC\frac{dv_i\ (t)}{dt}$

(iv) $v_0 = -RC\int_0^t v_i\ (t)\,dt$

(h) Three Boolean operators are :

(i) NOT, OR, AND

(ii) NOT, NAND, OR

(iii) NOR, OR, NOT

(iv) NOR, NAND, NOT

(i) Lissajous pattern obtained on the screen of a CRO can be used to determine :

(i) Phase shift

(ii) Amplitude distortion

(iii) Voltage amplitude

(iv) None of the above

(j) "A digital voltmeter has negligible loading effect on the circuit under test because its input resistance is very high". The above statement is :

(i) True

(ii) False

SECTION - B

2. Attempt *any three* parts of the following : (3x10=30)

(a) (i) Describe the conditions established by forward and reverse-bias conditions on a p-n junction diode and how the resulting current is affected.

(ii) Calculate forward current I_F for the silicon diode with dynamic resistance $r_d = 0.25\Omega$ used in the following circuit of Figure - 2.

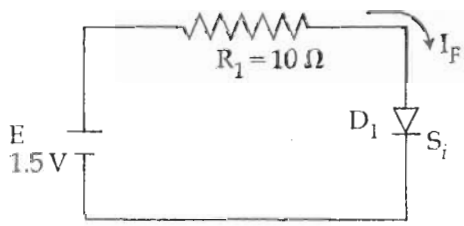

Figure - 2

(b) (i) What is the major difference between a bipolar and an unipolar device ? Explain with example.

(ii) Draw and explain the input and output characteristics of common base configuration using npn bipolar junction transistor. Indicate all the region of operations.

(c) (i) What are the advantage of FET over BJT. Explain.

(ii) Derive expressions for voltage gain of inverting and non-inverting ideal operational amplifier configurations.

(d) (i) What are universal gates ? Why they are called so ? Justify your answer.

(ii) What do you understand by don't care conditions ? Is it an advantage or disadvantage to include them in a map. Explain with reasons.

(e) Draw the block diagram of a CRO and briefly explain the function of each block.

SECTION - C

Attempt **all** questions. All questions **carry** equal marks. **(5x10=50)**

3. Attempt *any two* parts of the following : **(2x5=10)**

(a) Describe the physical mechanism of Zener breakdown. For the circuit shown in Figure-3, find the voltage drop across the 5 kΩ resistance.

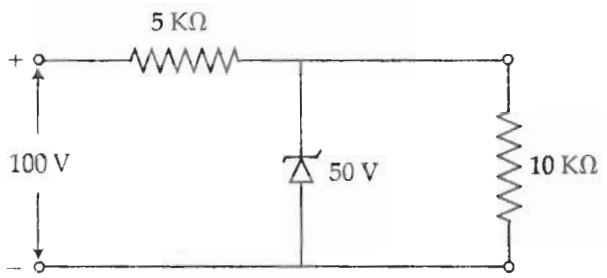

Figure - 3

(b) Sketch a two - diode full wave rectifier circuit for producing a positive output voltage. Sketch the input and output waveforms and explain the circuit operation.

(c) Draw a voltage doubler circuit. Sketch input and output waveforms and explain the circuit operation.

4. Attempt *any one* of the following : **(1x10=10)**

(a) Derive the expressions for voltage gain, current gain and input impedance in terms of h-parameters for common emitter amplifier.

(b) Determine the following for the voltage divider bias circuit shown in Figure-4.

(i) I_C (ii) V_E (iii) V_B (iv) V_{CE} and (v) R_i

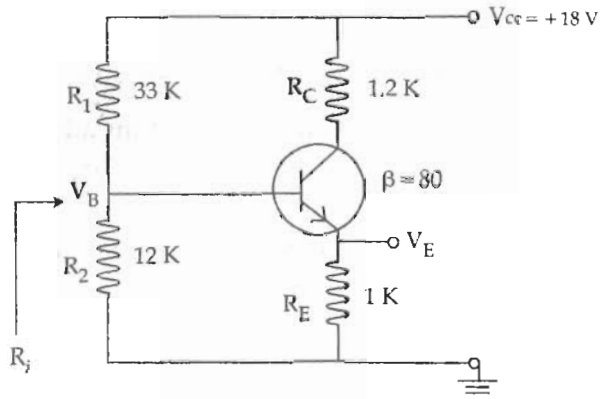

Figure - 4

5. Attempt *any one* of the following : **(1x10=10)**

(a) Describe the construction and operation of a MOSFET in enhancement mode. Draw its characteristics and equivalent circuit of the device.

(b) **(i)** Draw the circuit diagram for unity gain amplifier. Where is it used and why ?

(ii) Find the output voltage of the following op-amp circuit shown in Figure-5.

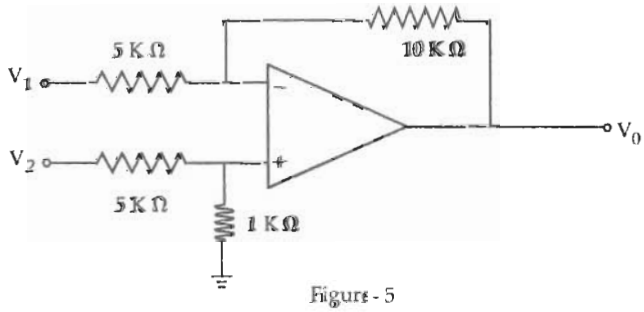

Figure - 5

6. Attempt *any two* parts of the following : (2x5=10)

(a) (i) Add and subtract without converting the following two octal numbers 7461 and 3465.

(ii) Convert the following numbers as indicated :

(A) $(62.7)_8 = (\_\_\_\_\_)_{16}$

(B) $(BC\ 64)_{16} = (\_\_\_\_\_)_{10}$

(C) $(111011)_2 = (\_\_\_\_\_)_5$

(b) (i) Represent the unsigned decimal number 965 and 672 in BCD and then show the steps necessary to form their sum.

(ii) Express the Boolean function $F = xy + z$ in a product of max term form.

(c) Given the Boolean function.

F (A, B, C, D) =

$$\overline{A}\,\overline{B}\,\overline{C} + A\,\overline{C}\,\overline{D} + A\,\overline{B} + A\,B\,C\,\overline{D} + \overline{A}\,\overline{B}\,C$$

(i) Express it in sum of minterms.

(ii) Find the minimal sum of products expression using K-map and implement the output using NAND gates only.

7. Attempt *any one* of the following : (1x10=10)

(a) Draw the Lissajous pattern you expect when the ratio of the frequency of the vertical input to that of the horizontal input is 1 : 2. Explain with the help of a neat diagram, why you get this pattern.

(b) Explain briefly the working principle of a digital voltmeter. What are the advantages obtained by numeric read out ?

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